

ESTABLISHED 1850.

THE DEFIANCE MACHINE WORKS,

DEFIANCE, OHIO, U.S.A.

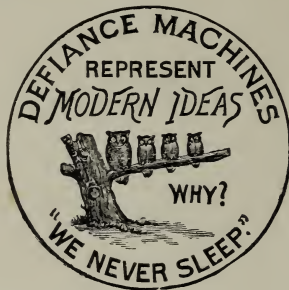


BUILDERS OF

PATENT WOODWORKING MACHINERY.

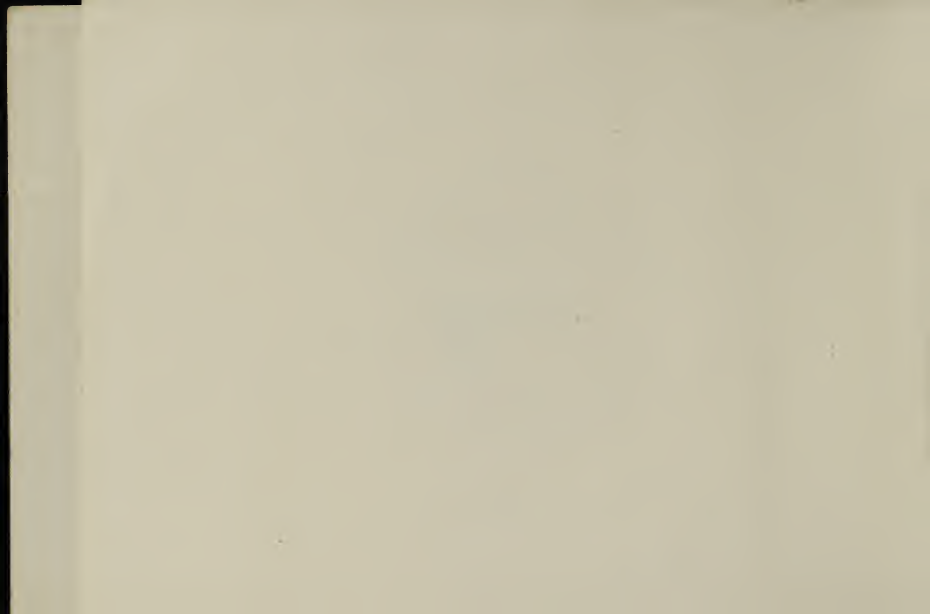
PETER KETTENRING.

WM. A. KETTENRING.



RANSOM P. KETTENRING.

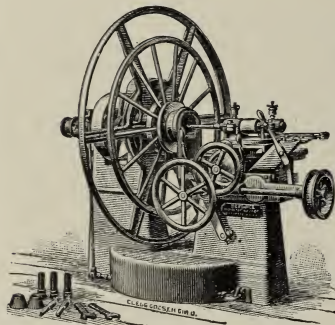
CHARLES H. KETTENRING.



✕ ✕

***T**HIS SMALL CATALOGUE CONTAINS A PART OF THE 300
DIFFERENT CLASSES OF WOOD-WORKING MACHINES
WE ARE BUILDING. SHOULD YOU FIND ANYTHING IN IT
OF INTEREST TO YOU, WRITE US AND WE WILL SEND
YOU LARGE CIRCULARS, WITH HANDSOME ENGRAVINGS
AND DESCRIPTIVE ARTICLES. PRICES AND FULL INFOR-
MATION CHEERFULLY GIVEN UPON APPLICATION.*

THE DEFIANCE MACHINE WORKS,
Defiance, Ohio, U. S. A.

PAT. No. 0 WHEEL BOXER.

COLUMBUS BUGGY COMPANY,
Columbus, Ohio, March 5, 1891.

THE DEFIANCE MACHINE WORKS, Defiance, Ohio.

Gentlemen:—The No. 0 Wheel Boxing Machine we purchased from you some four months ago is entirely satisfactory. The device for centering the wheel is an ingenious one, very rapid, and not only holding the hub true, but also the rim and tire, and the cutter running at a high rate of speed bores the hole smooth and true to the exact shape of the box, and relieving the ends of the spokes so they do not bear on the box. One man can bore and box 12 sets of wheels per hour, or bore 18 sets. The cutters are simple, easily made and kept in order by the operator. We do not see how the machine could be improved on. We remain,

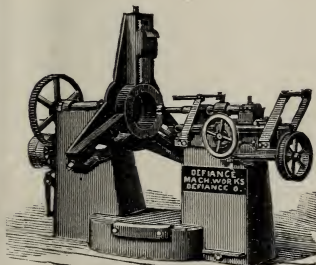
Yours very respectfully,

COLUMBUS BUGGY CO.
FRED WEADON, Supt.

This Machine is used to bore the Hubs of Carriage Wheels and prepare them to receive the Boxes.

No. 1 WHEEL BOXING MACHINE.

This is the same kind of a Machine as the No. 0 Wheel Boxer, shown on opposite page, excepting it is heavier and more especially intended for treating Farm Wagon, Truck and Heavy Artillery Wheels. A few of the well known houses using this machine are as follows:

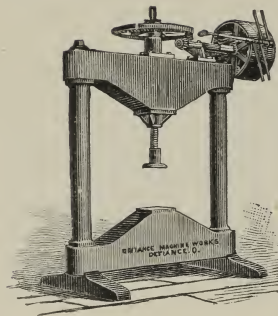


Schuttler & Hotz.....	Chicago, Ill.
Mitchell & Lewis Co.....	Racine, Wis.
Bain Wagon Co.....	Kenosha, Wis.
Troy Wagon Works Co.....	Troy, Ohio.
Champion Wagon Co.....	Owego, N. Y.
Crane & Breed Mfg. Co.....	Cincinnati, Ohio.
Turnbull Wagon Co.....	Defiance, Ohio.
Crescent Wagon Co.....	Driftwood, Pa.
Chatham Wagon Mfg. Co.....	Chatham, Ont., Can.
Keystone Wagon Co.....	Reading, Pa.
Texas State Penitentiaries.....	Huntsville, Texas.
Winona Wagon Co.....	Winona, Minn.
Flint Wagon Co.....	Flint, Mich.
King & Hamilton Co.....	Ottawa, Ill.

AND ONE HUNDRED OTHERS.

This Machine swings 5 ft., but can be furnished to swing 6, 7 and 8 ft., if so ordered.

BOX PRESSING MACHINE.



This machine is used for Pressing in Boxes, and Pressing Bands and Flanges on both light and heavy wheels. The same operator should handle it that runs the Wheel Boxer, shown on forward pages.

We have over 200 of these machines in use.

No. 1 PAT. SPOKE DRIVER.

This machine is used to drive Spokes into the Wheel's Hub. It will drive either light or heavy work, and it is a great labor-saving machine.

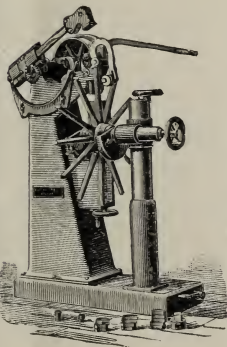
KING & HAMILTON CO.
Manufacturers of Farm Wagons, etc.

Ottawa, Ill., July 27, 1891.

THE DEFIANCE MACHINE WORKS, Defiance, Ohio.

Gentlemen:—The No. 1 Automatic Spoke Driving Machine, purchased from you one year ago, is giving perfect satisfaction, doing good work, and no fault to find whatever. We are well pleased with it.

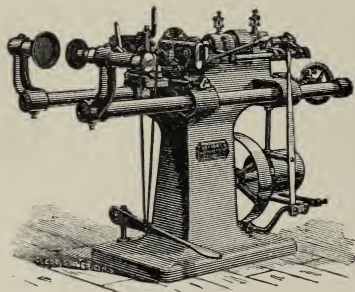
KING & HAMILTON CO.



PAT. WHEEL TENONING AND CUT OFF MACHINE.

This machine is used by Wagon and Wheel Makers for cutting off the thread end of spokes, and cutting tenons thereon for the reception of the felloes. Over 300 of them are in successful operation.

The following is a partial list of manufacturers using them:



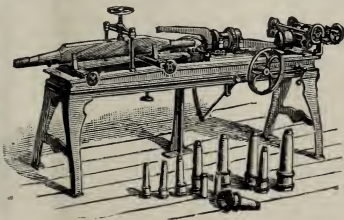
Healey & Co	New York City.
American Wheel Co	20 Machines.
Geo. E. Nissen & Co	Salem, N. C.
King & Hamilton Co	Ottawa, Ill.
Bain Wagon Co	Kenosha, Wis.
National Wheel Co	Jackson, Mich.
Craver & Steel Mfg. Co	Harvey, Ill.
Flint Wagon Co	Flint, Mich.
Champion Wagon Co	Owego, N. Y.
Du-Bois Mfg. Co	Philadelphia, Pa.
Wilmington Wheel Co	Wilmington, Del.
Kentucky Wagon Mfg. Co	Louisville, Ky.
Royer Wheel Co	Cincinnati, Ohio.
Columbus Cart Co	Columbus, Ohio.
Columbus Wheel Co	Columbus, Ohio.
Columbus Buggy Co	Columbus, Ohio.
Schad Wheel Co	Avoca, N. Y.
Buffington Wheel Co	Burlington, Iowa.
N. W. Carriage & Sleigh Co	Milwaukee, Wis.
Hoopes Bros. & Darlington Co	West Chester, Pa.

This machine is thoroughly covered by Letters Patents in the following Countries: United States, England, Germany, France and Belgium.

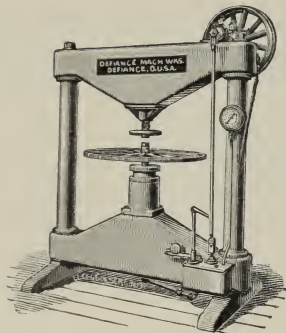
No. 5 PATENT AUTOMATIC
SKEIN SETTING AND FITTING MACHINE.

This is an automatic machine used by wagon manufacturers for turning the ends of wooden vehicle axles to proper shape to receive the skeins. It will do the work so that no hand fitting is required whatever. The skein itself is used as a pattern to guide the path of the cutting tool. It will fit either cast iron or steel skeins, from $2\frac{3}{8}$ " to 5", at the rate of 200 axles per day.

It will save its cost in 3 months, over hand labor.

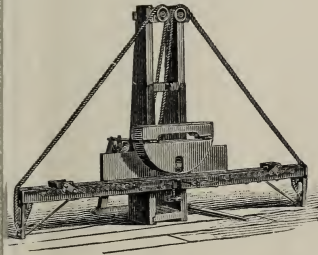


60 TON, IRON FRAME

IMPROVED HYDRAULIC WHEEL PRESS.

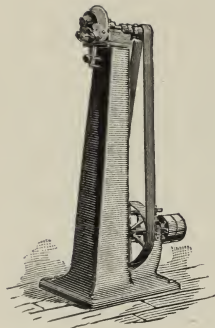
This engraving represents a patent Hydraulic Wheel Press of 60 tons capacity. It is used by Wheel and Wagon Builders, for pressing Boxes into the Wheel's hub and pressing Bands and Flanges thereon. It is provided with a safety valve and a pressure gauge which shows the strain being applied in both tons and pounds per square inch. The adjusting screw, with hand wheel attached, as shown immediately above the ram, avoids filling in with blocks, which effects a great saving in time.

PATENT FELLOE BENDER.



This machine is used for bending Felloes, Wagon-Hounds, Carriage Reaches, Sled-Runners, Chair Stock, etc., from 18" to 84" circles; bending from the very lightest stock up to 4" thick, 9" wide. Machine built with iron frame, iron form, friction counter and automatic releasing attachment. It will pay you to understand the advantages of it over others.

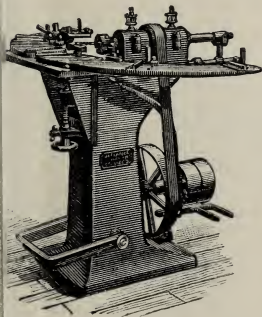
Write us for large circular, price, etc.



FELLOE ROUNDER.

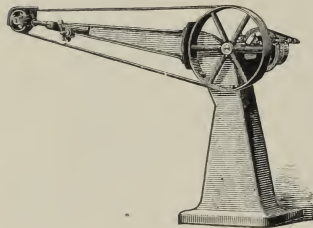
This machine is used for rounding the inner circle of Rims or Felloes between the spoke holes. It is fitted with steel Cutter-Heads of small diameter to form a neat round close up to the spoke hole. It is used by all first-class wheel makers. It will do smooth work without tearing.

FELLOE BORING MACHINE.



This machine bores the spoke holes in Rims or Felloes, and at the same time faces off a circular spot on the inside around the tenon hole to form a perfect bearing for the shoulder of the Spokes against the Fellloe. It is also supplied with a self-spacing attachment to space the boring without marking off, and a compressing attachment to bore either a round or oblong hole.

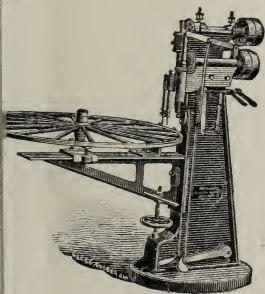
ADJUSTABLE ARM SANDER.



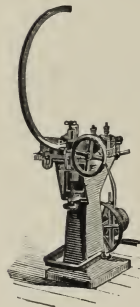
This is a Belt Polishing Machine for Sand or Emery Belts, for polishing either Wood, Iron or Steel. It will carry a belt from 1" to 6" in width. The projecting arm can be adjusted up or down to best suit the operator. The belt is 15 ft. long, and it is strained outward by rack and pinion to tighten the belt.

Try it and you will be happy.

WHEEL BORING AND SCREWING MACHINE.



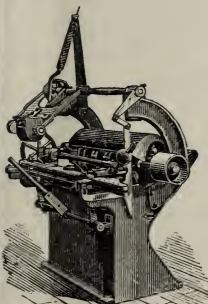
This is a Wheel Boring and Screwing Machine used by Carriage Wheel Builders. It bores two holes at one time through the wheel's felloe, at each side of the spoke, to receive wood screws, which are driven in with a screw driving attachment operated by power, and located beside the boring spindles. The boring and inserting of the screws is finished complete on this machine at the rate of 100 sets of wheels in 10 hours. The object is to prevent the felloes from splitting.



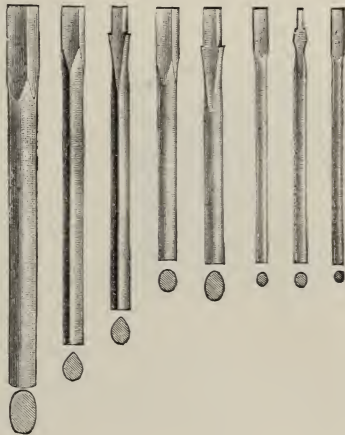
DOWELL HOLE BORER.

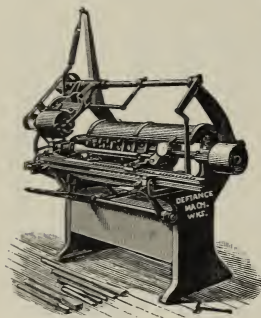
This engraving represents a special machine used by Wheel Builders for boring the Dowell Holes in the ends of Felloes. It centers the work true with the boring bit, and its capacity is sufficient for the very largest wheel factories.

32" SPOKE LATHE.

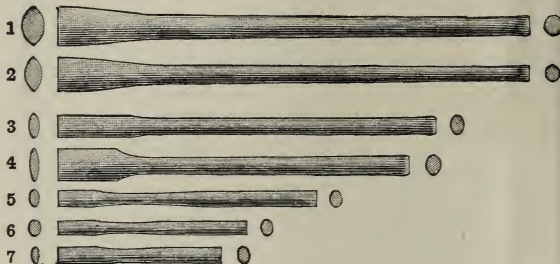


This engraving represents a Patent Automatic Machine used for turning Spokes. It will turn and square complete in 10 hours 2,500 spokes, and do the work smooth, so that little polishing is necessary. It will make common wagon spokes, Sarven patent carriage spokes or sharp edged patterns, as shown by the accompanying cuts. This machine is used by all the leading American spoke makers.



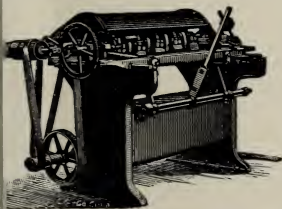


42" HANDLE LATHE.

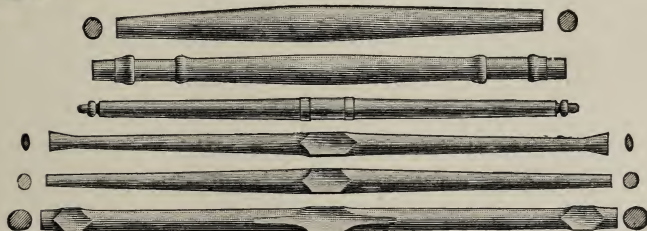


This machine is used for turning Hammer, Hatchet, Sledge, Railroad and Mining Pick Handles, as shown by the engravings. It performs the work smooth and complete, so that no hand labor is required. It will produce from 2,500 to 3,000 handles in 10 hours, and it is the greatest labor-saving machine ever produced for handle making.

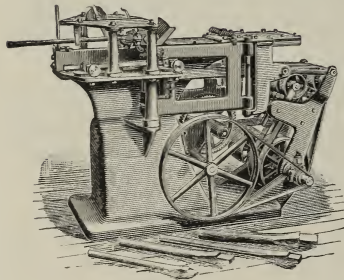
48" NECK-YOKE AND SINGLETREE LATHE.



This machine will turn Wagon and Carriage Neck-yokes, turning plain or beaded ends; also round and oval Singletrees, with plain or ferrule ends, as well as Carriage Doubletrees, Round and Flat Tailed Buggy Whiffletrees, as shown by the engravings. It is an indispensable machine to manufacturers in this line, as it will do the work of at least six old style machines. Capacity, 2,000 per day

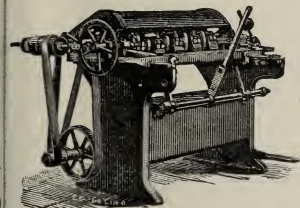


DOUBLE AUTOMATIC
SPOKE FACING AND TAPERING MACHINE.



This is an Improved Spoke Facing and Tapering Machine, with a daily capacity of 12,000 spokes. It planes both sides at the tenon end and cuts the taper or miter all at one operation, and true with the barrel of the spoke. It will be found in use by the principal spoke, wheel and wagon manufacturers.

VARIETY LATHE.

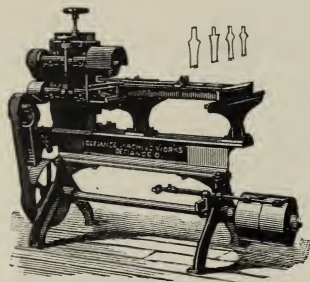


This engraving represents our patent Variety Turning Lathe. It is used for turning Table Legs and other shapes of this kind, as shown by illustrations below. In a moment's time it can be adjusted to turn from round to square, square to hexagonal, oval or any other

shape, depending entirely upon the shape of cam or form placed into the machine. As well it will produce paint, duster and beaver-tail brush handles, chisel, maul and other kinds of tool handles. Its capacity varies from 2,000 to 3,000 pieces per 10 hours, depending upon the nature of the work and kind of timber used. A full line of samples of turning will be sent upon application to any address.

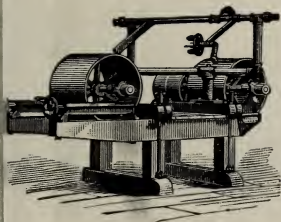


SPOKE TENONER.



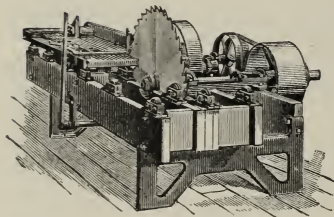
This cut represents our improved Spoke Tenoning Machine. It will cut plain tenons or tenon miters and point a spoke complete at one pass through the machine. It is built heavy and will cut tenons on oak or hickory spokes to a uniform size, and do the work smooth without tearing. The counter is a part of the machine, and it is sent out ready to run.

18" SAND BELT MACHINE.



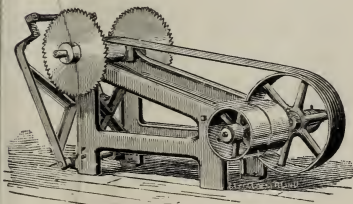
This represents our 18" Sand Belt Machine, which is used for polishing Spokes, Handles, Neck-yokes, Singletrees, etc. It is furnished with an attachment to hold and turn the piece to be polished; also, an attached counter. The pulleys are perfectly balanced by our patent centrifugal method.

48" BOLTING SAW



This engraving represents our improved 4-foot Bolting Saw, which is used to cut spoke and handle squares from the log. The table is fed forward and backward by friction feed, with quick return movement. It is built to saw up to 10 feet.

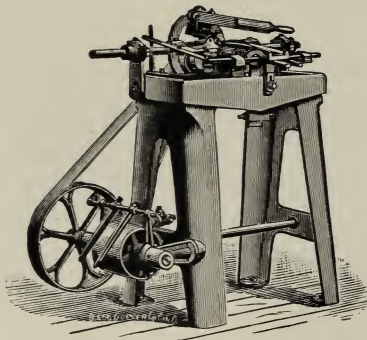
DOUBLE EQUALIZER.



This machine is used for equalizing Spoke and Handle Material, preparing it for the Lathe. It carries two 20" saws, which can be instantly adjusted by loosening a single screw various distances apart for short or long stuff. Both ends are cut off at one operation.

IMPROVED SPOKE THROATING MACHINE.

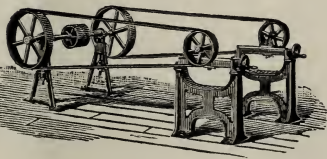
With Improved Cutter Head; Attached Counter.



This engraving represents our improved Spoke Throating Machines. It will throat any kind of spokes, common, Sarven patent or sharp-edged, from the smallest sizes up to 5", and do the work smooth without tearing. It is the only successful throater in the market.

It is very simple to operate.

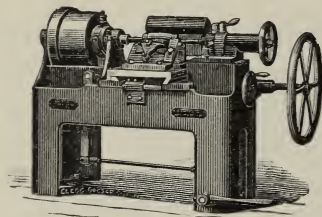
DOUBLE SAND BELT MACHINE.



This is one of a very large variety of Belt Polishing Machines we are making. It is used for belting spokes, handles, neck-yokes, singletrees, shafts, poles and other wood-work; or by using emery belts can be used to polish iron or steel.

It will carry belts up to 6" wide and under.

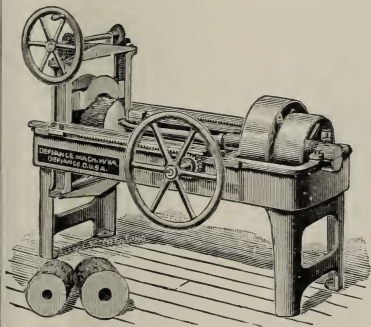
PATENT HUB LATHE.



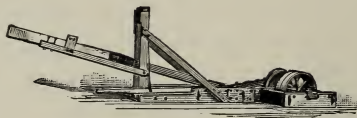
This machine is used for turning Hubs for Wagon and Carriage Wheels. It takes the rough block and finishes the hub complete at one operation, except mortising. It will make hubs up to $16\frac{1}{2}$ " diameter, 18" long, and all sizes under. It will make 1,000 small hubs or 600 heavy ones in 10 hours, and produce them of uniform shape and size. Its capacity is equal to 12 hand turners, and the results more satisfactory. Every first-class hub and wheel maker in the States is using this machine.

We make a full line of Hub Machinery, as shown by the following pages.

HUB BORING AND REAMING MACHINE.

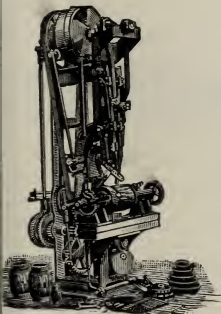


This machine is used for boring either a straight or taper hole in Hub Blocks, preparing them to receive the hub lathe mandrel, upon which they are turned, as well as for reaming finished hubs. It is fitted with universal self-centering jaws to center the hub true with the boring tool. It is a substantial machine intended for rapid work.

DRAG SAW.

This cut represents a Drag Saw, which is used for sawing off logs, and it is used by hub manufacturers for cutting hub blocks from the log, as well by spoke, handle, stave and heading factories, saw mills, etc.

HUB MORTISER.



This represents our patent Automatic Double Chisel Hub Mortising Machine. It is built in three sizes—No. 0 for light carriage wheel hubs not larger than 6" diameter; No. 1 machine will mortise up to $11\frac{1}{2}$ ", and the No. 2 machine will mortise up to $16\frac{1}{2}$ " diameter. The hub is placed into the machine and mortised automatically, cutting straight or stagger mortises with equal success, at the rate of 600 hubs per 10 hours. So simple is this machine that in many large wheel and wagon factories a single operator handles two machines

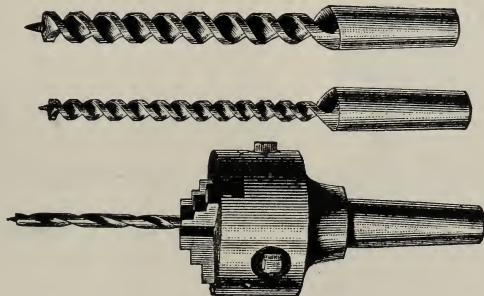
SOLID STEEL HUB REAMER,

For Boring or Reaming Hubs.

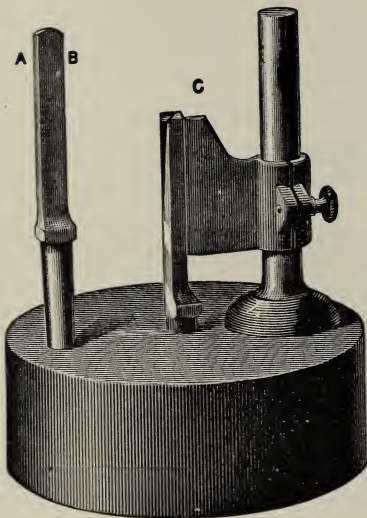


The above engraving represents our solid steel Hub Reamer, used for boring and reaming hubs. They are furnished either straight or tapering, any diameter or length, and shanks to suit purchaser. We claim to make the most substantial and best cutting Reamer in the market, and can execute orders promptly.

TWIST HUB AUGERS.



We also furnish Twist Augers of any size for boring hubs, rims and general work, and solid or universal chucks for holding them.



MORTISING

MACHINE CHISEL TESTER.

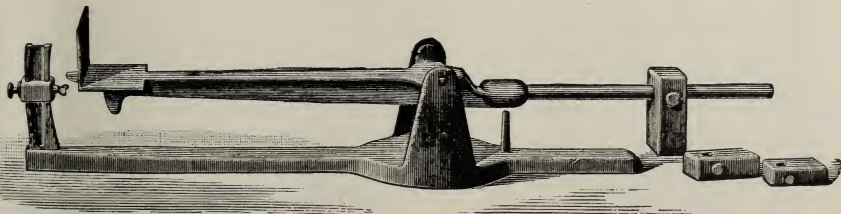
Something New and Important to
Users of Mortising Machine Chisels.

We take pleasure in presenting to the trade a new device for ascertaining with accuracy the exact condition of Chisels used for mortising. A very large percentage of breaking chisels is caused by their being out of truth; furthermore, perfect mortising cannot be accomplished with untrue chisels.

The accompanying cut represents a device which, by its use, the operator can in a moment's time test and correct them.

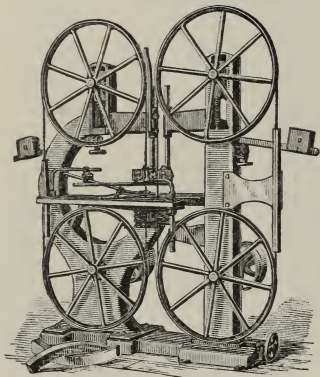
For the Defiance Double Chisel, Mortising Chisels and Points this tool is indispensable.

PATENT PROPORTIONAL
KNIFE AND BIT BALANCING MACHINE.



This Scale is used for obtaining a running balance to all classes of wood-working machine knives and cutters. Its use prevents hot bearings, and enables smoother and more work to be accomplished. It will pay for itself every time it is used. Price, \$15.00.

DOUBLE BAND SAW.

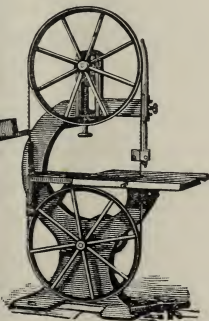


This engraving represents our Patent Double Band Saw, which is used for sawing felloes for wagon wheels, cants for wood pulleys, chair backs, and other circular work. It carries two saws and will do three times more work than a single machine. It can also be used as a regular band saw, by removing one saw blade.



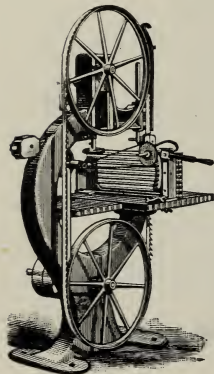
The above small engraving represents an improved automatic Band Saw Setting Machine, with filing vise, frame and wheels, which is intended for dressing saw blades. The success of any band saw depends largely upon the condition of the saw blades.

36" BAND SAW.



This engraving represents an improved 36" Band Saw, which is fitted with an iron tilting table, ball-bearing guides, attached counter with belt shipper. It weighs 1,500 pounds, will carry a saw from $1\frac{1}{8}$ " wide for the finest scroll work, or a saw up to $1\frac{1}{2}$ " wide for heavy work. It is the most complete and perfect machine in the market, and is offered at a very reasonable price.

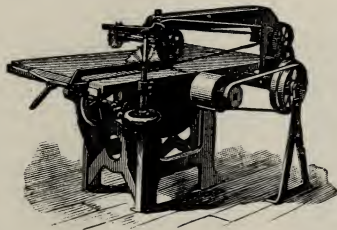
36" BAND RE-SAW.



This cut shows our improved No. 2 36" Band Saw, with re-sawing attachment, which is calculated for splitting either straight or bevel lumber up to 12" wide and under. This attachment can be quickly placed on or removed from the machine. Thus the machine will cover a wide range of work accommodating re-sawing as well general band-saw work

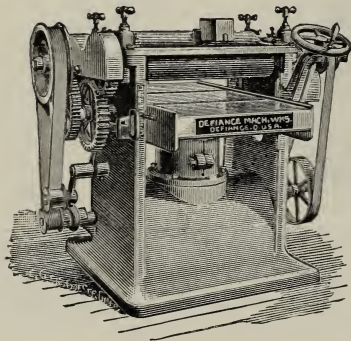
It is the most complete general purpose machine
in the market.

POWER FEED RIP SAW.



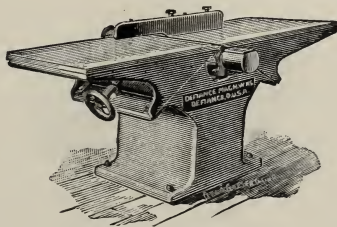
We build two sizes of Power Feed Rip Sawing Machines. They are furnished with iron table cast in one piece, an extended arbor to carry one or more saws, patent fence and re-sawing attachment. They are the heaviest, most powerful and rapid machines in the market. Will do the work of three hand feed machines.

NO. 1 IMPROVED 24" HEAVY SURFACE
PLANING AND SMOOTHING MACHINE.



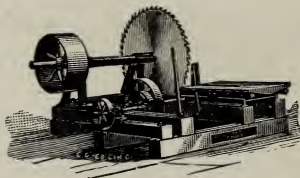
We recommend this improved 24" Single Surface Planing and Smoothing Machine to parties who desire to do perfect work in a rapid manner. It weighs 3,000 pounds; is fitted with center support to table; cut gearing and 4 live feed rolls. The rolls and cylinder are placed close together for the purpose of planing short stuff without clipping the ends. It is furnished, when so ordered, with a vulcanized rubber feed roll, to plane strips of varying thickness.

SOLID FRAME
JOINTING AND HAND PLANING MACHINE.



This engraving represents our improved solid frame Buzz or Hand Planer, with tables measuring 7 feet from out to out. It is built in two sizes, 16" and 24" wide, and it is supplied with a beveling fence, and all modern conveniences. It costs a little more than some others, but it is heavier, and well worth all asked for it.

STAVE AND HEADING BOLTER.



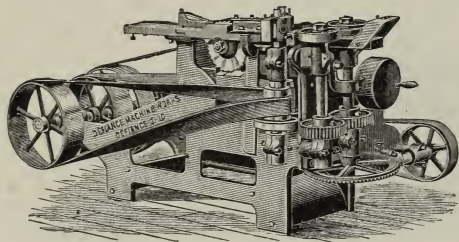
This cut represents our improved 60" Stave Heading and Shingle Bolter, used for splitting round bolts into sections, preparing them for the stave, heading or shingle saw. By its use an immense saving is effected, and the work performed much better than by hand labor.

SHAFT AND POLE BENDER.



This machine we term our patent hot form Shaft and Pole Bender. It will make a single or double bend at the heel end of shafts and poles, and bend the body of shafts at the same operation. The bending and seasoning are performed at one and the same time, and when once bent the material will hold its shape in any climate. Exhaust steam is commonly used for heating the forms. It is the only successful shaft and pole bender in the market.

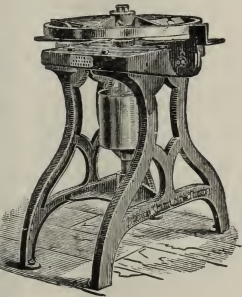
We make a full line of Finishing Machines to do the shaping, tapering, mortising, tenoning and polishing.

KETTENRING'S PAT. HOOP MACHINE.

This cut represents the Kettenring Patent Hoop Machine, which is used by the leading hoop manufacturers for making flat coiled barrel and keg hoops. It produces two hoops from a bar of wood $1\frac{7}{16}$ " wide, $\frac{1}{16}$ " thick. It makes two hoops at one and the same time, at the rate of 15,000 per day. It makes a sawed hoop, which commands a

higher price than the cut hoop; as well it is not necessary with this system to steam the log or plank, which effects a large saving. 3,000 hoops can be made with this machine from 1,000 feet of plank.

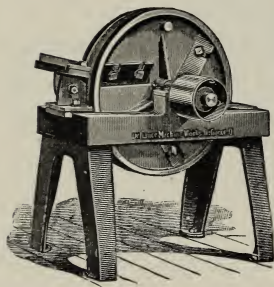
The three machines on the following pages are used to lap, point and coil the hoops, preparing them for market.



HOOP LAPPER.

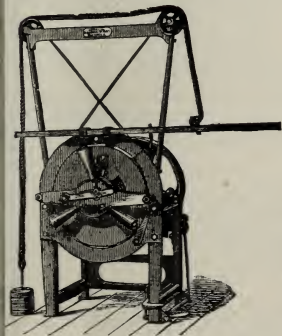
This engraving represents our improved Hoop Lapping Machine, which is used to cut a taper lap on one end of barrel and keg hoops. It has the same capacity as the Kettenring Hoop Machine. It is very simple in its operation, and can be handled by cheap labor.

HOOP POINTER.



This cut represents our improved Hoop Pointing Machine, used for cutting the point at the opposite end of hoop from the lap. It also has the same capacity as the Kettenring Hoop Machine. The end of the hoop is placed on the table between two revolving cutter heads, and both sides of the point are cut at the same time. The knives are shear-cutting, and will cut smooth without tearing.

HOOP COILER.



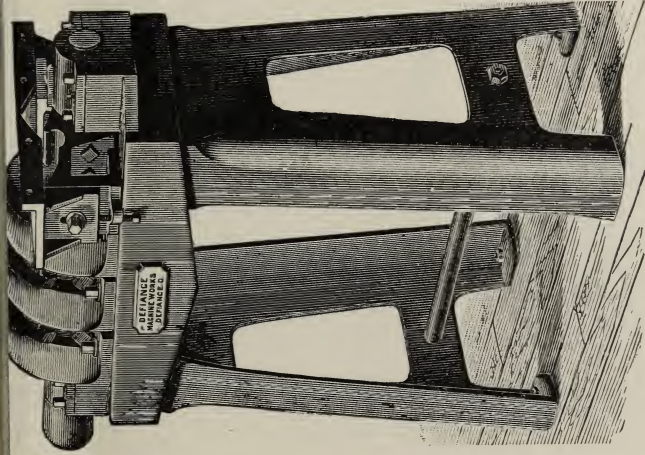
This engraving represents a patent Automatic Hoop Coiling Machine, used for putting the hoops into the coil, preparing them for market, and it is the last operation performed upon the hoop. Its capacity is from 15,000 to 18,000 hoops in 10 hours, and it contains many advantages over other machines intended for the same work.

PATENT SWING SAW.



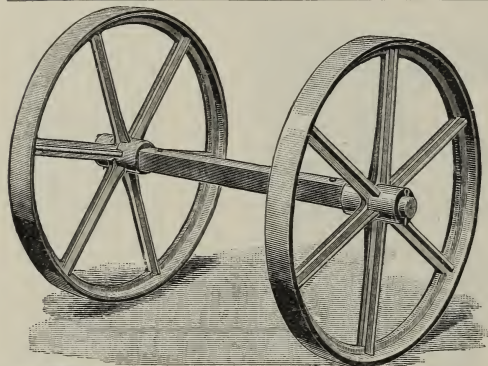
This engraving represents our patent Swing Cut-off Saw, with iron frame cast in one piece. Hanger in one piece, with shaft connecting frame to hanger stationery, so that no wear to the boxes occur, which prevents lateral motion. The saw is surrounded with a shield to protect the operator. The saw, after being pulled forward and completing its work, has a self-returning movement, effected by means of spring balances.

This machine is furnished in different lengths to suit any ceiling.



ROUNDING MACHINE.

The above cut represents our improved Rounding, Chamfering and Cornering Machine, with 6" Buzz Planer attachment, and it is used by wagon, carriage gear, shaft, pole and agricultural implement manufacturers. Shafts, poles, fellocs, etc., can be finished complete on this machine without leaving the operator's hands. It is supplied with Boring Attachment when ordered.



FACTORY

TRULLEY WHEELS.

These wheels are 20" diameter, 2" face, of cast iron, with a wrought iron tire shrunk onto them. Hubs bored complete, with $1\frac{1}{4}$ " square axle.

Price per pair.....\$7.50



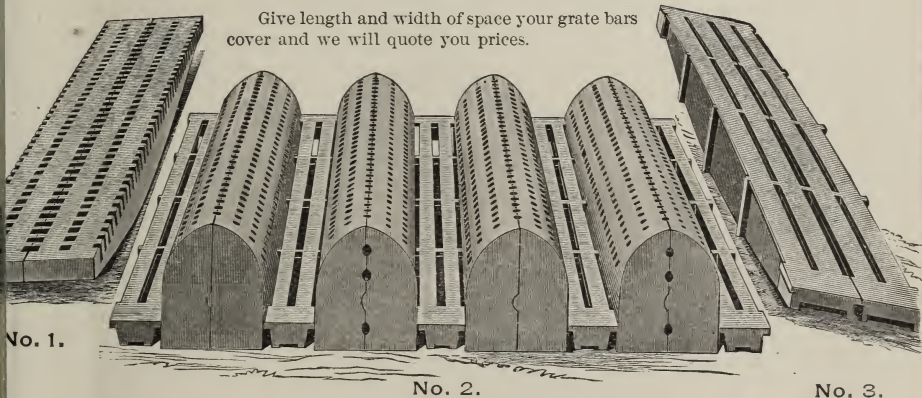
IRON CASTERS, self adjusting, with friction rollers, running against bottom plate.

Price each, complete.....\$1.50

IMPROVED SAWDUST BURNING GRATE BARS,

As shown by Engraving No. 2,
For Boiler and Other Furnaces.

Give length and width of space your grate bars
cover and we will quote you prices.



POWER OF BELTING.

Horse-power of a belt equals velocity in feet per minute, multiplied by the width—the sum divided by 1,000.

One inch single belt, moving at 1,000 feet per minute=1 horse-power.

Double belts about 700 feet per minute, per 1 inch width=1 horse-power.

For double belts of great length, over large pulleys, allow about 500 feet per minute per 1 inch of width per horse-power.

Power should be communicated through the lower running side of a belt; the upper side to carry the slack. Average breaking weight of a belt, 3-16 x 1" wide—leather, 530 lbs.; 3-ply rubber, 600 lbs.

HOW TO CALCULATE SPEED.

To find the speed of a countershaft, if the revolutions of the main shaft and size of pulleys are given—multiply the revolutions of the main shaft by the diameter in inches of the pulley, and divide by the diameter in inches of the pulley on the countershaft. The quotient will be the number of revolutions.

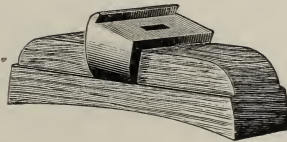
EXAMPLE.—What will be the speed of a countershaft with a 12" pulley driven by a 30" pulley 180 revolutions per minute— $180 \times 30 \div 12 = 450$.

To find the size of a pulley required, if the number of revolutions and size of pulley on the main shaft are given—multiply the diameter in inches of driving pulley by the revolutions of the main shaft, and divide by the speed required. The quotient will be the diameter in inches of the pulley.

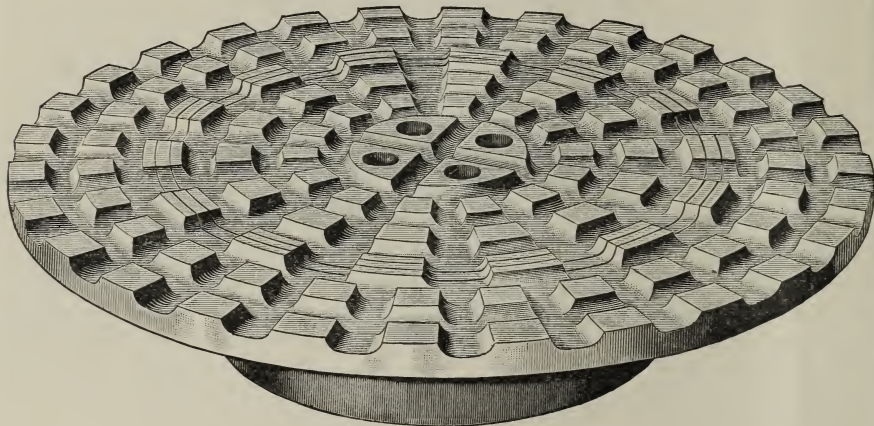
EXAMPLE.—What will be the diameter of a pulley to make a countershaft turn 450 revolutions per minute, driven by a 30" pulley 180 revolutions per minute— $180 \times 30 \div 450 = 12$ " pulley.

To find the size of a pulley for a main shaft, if the speed of shafts and diameter of pulley on the countershaft are given—multiply the diameter in inches of pulley by speed of the countershaft, and divide by the revolutions of the main shaft. The quotient will be the diameter of the pulley.

EXAMPLE.—What will be the diameter of a pulley, on a main shaft making 180 revolutions per minute, to drive a 12" pulley 450 revolutions per minute— $450 \times 12 \div 180 = 30$ " pulley.

CAST IRON BRAKE BLOCK.

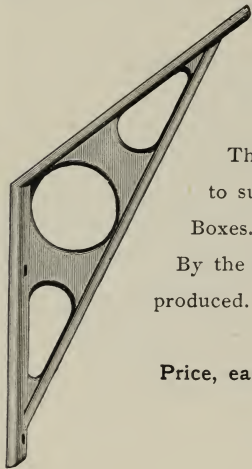
The above cut shows an improved cast iron Brake Block attached to a wooden Brake Shoe, which are fastened to the brake beam of a wagon by a single bolt through the square hole shown in the engraving. This hole is provided with square countersink for the bolt head to rest in. The wooden shoe is fitted to the iron block on a taper or wedge, which holds it in proper place; thus when the wooden shoe becomes worn out, a new one can be replaced by simply slipping it into the socket without loosening a bolt. **Price per pair, 10 cents.**



STREET MANHOLE RING AND COVER.

The engraving on opposite page represents a heavy Manhole Ring and Cover. We make a large variety of sizes and shapes. The one herewith illustrated is used for street sewers principally, and it is of the following proportions: Total diameter, 36"; small diameter of ring, 19"; diameter of cover, 22".

Weight.....	406 pounds.
Price	\$12.18.



WAGON BOX BRACKETS.

This engraving represents a Cast Iron Bracket, which is used to support the Foot Board and Side Extension Boards on Wagon Boxes. They are very neat in appearance, and easily attached. By the use of our improved Wagon Irons more attractive work is produced.

Price, each8 cents.

IRON BRAKE BOX.



This engraving represents an iron Brake Box used underneath the wagon bed to support the brake rod. They are held to bottom of the bed by two small bolts. They are easily put on; cheaper and look much better than a wooden box.

Price, per pair 10 cents.

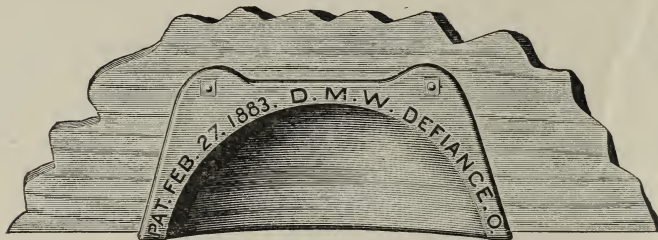
COMMON RUB IRON.



This engraving represents a common Rub Iron used underneath the wagon bed to prevent the wheel from rubbing against the bed.

Price, per pair 8 cents.

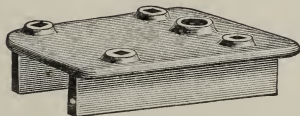
THE DICKMAN PATENT RUB IRON.



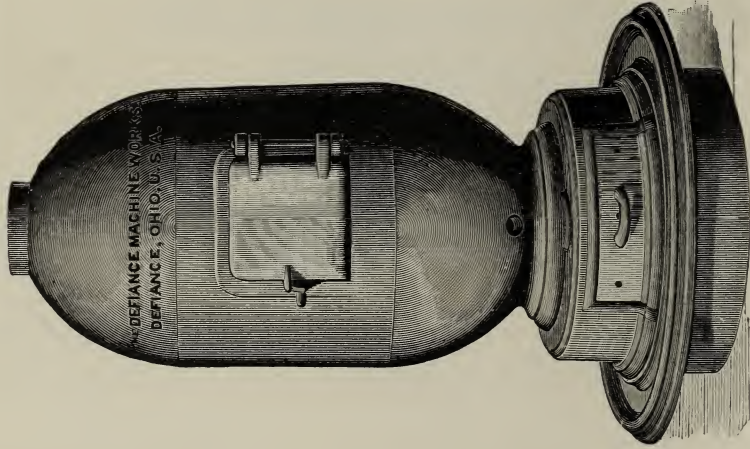
The above engraving represents the Dickman Patent Rub Iron, which is used on Wagon Boxes for the wheel to ride against when making a short turn. By its use it is impossible to lock the wheels in making a short turn. The concavity of this rub iron forms the arc of a circle corresponding to that of the wheel, whereby the wheel rim will have a bearing on all parts of the arc, which protects the tire and prevents it from wearing a hole in the wagon box. These patent irons will be found far superior to the common ones, and they are now used by some of the largest wagon manufacturers.

Price, per pair 50 cents.

CAST IRON WAGON REACH PLATES.

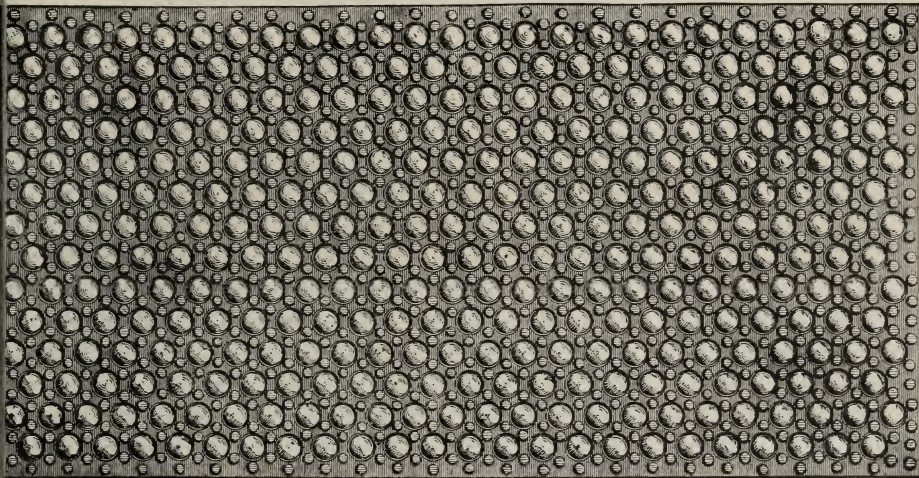


No. 0, with Flanges for $3\frac{1}{4}$ Reach.				Price, each, 15 cents.			
" 1,	"	"	" $3\frac{1}{2}$	"	"	"	20 "
" 2,	"	"	" $3\frac{3}{4}$	"	"	"	21 "
" 3,	"	"	" 4	"	"	"	22 "
" 7,	"	"	" 5	"	"	"	25 "
" 8,	"	"	" $4\frac{1}{2}$	"	"	"	24 "

**LARGE****FACTORY AND OFFICE STOVE.**

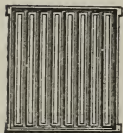
It will burn either wood or soft coal. A good heater. Can be furnished with a large water tank in place of round top. Has tight door, large ash-pot. Total height, 57". Diameter, 24". Weight, 837 lbs. Price, \$35.00.

PRISMATIC LIGHT TILE.

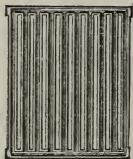


for lighting Vaults, Cellars, Stairways, etc. Made to any size or shape. Price varies with Construction.
Send for Estimates.

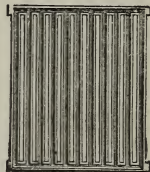
ROUND AND SQUARE
CAST IRON VENTILATING GRATES.



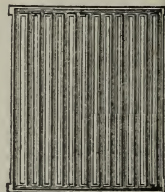
6" x 6", 30c each.



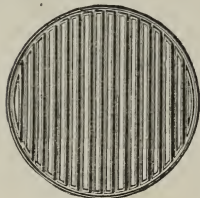
8" x 8", 35c each.



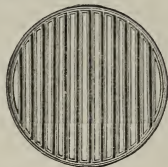
9" x 9", 40c each.



10" x 12", 50c each.



12" round, 55c each.



10" round, 40c each.



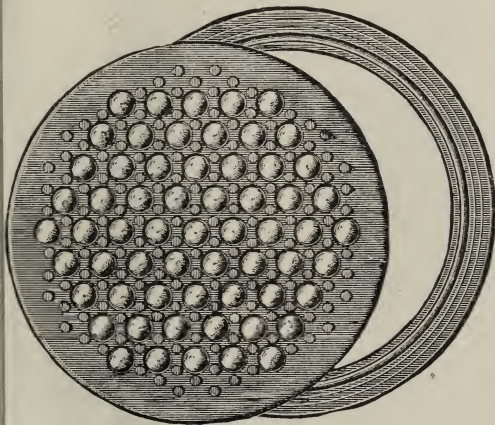
7" round,
25c each.



5" round,
15c each.



4" round,
10c each.



Cut of 24 inch 61 Glasses.

ROUND

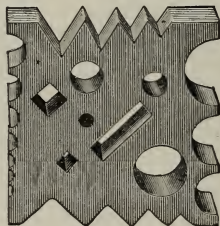
VAULT LIGHTS.

These lights are furnished in any diameter, with or without frames. They give a splendid light and are waterproof.

PRICE LIST.

21"—19" opening, 37 glasses... \$ 7 50
 24"—21½" opening, 61 glasses.. 10 00

Above prices include frames.

CAST IRON FORMING BLOCK.

This engraving represents a cast iron Forming Block, used by blacksmiths and iron workers generally, over which to form iron or steel shapes. It is true and well made, and will pay for itself in any shop in a short time. Size, 12" x 12" x 4" thick.

Price.....\$5 00

CAST IRON MANDREL.

The engraving represents a cast iron Cone or Mandrel, used by wagon and wheel manufacturers, blacksmiths, etc., over which to form and expand iron rings and circles. They are furnished in two sizes, as follows:

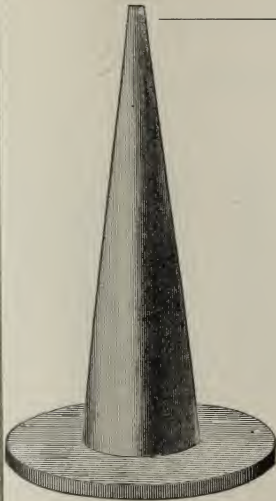
No. 1— $2\frac{1}{2}$ " at small end, 10" at large end, 37" long.

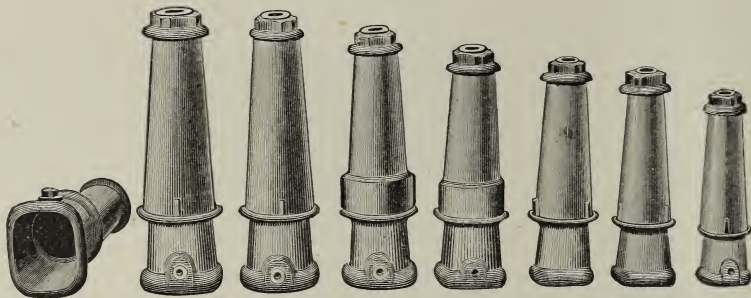
No. 2— $2\frac{1}{2}$ " at small end, 12" at large end, 49" long.

Price, No. 1.....\$ 7 00

Price, No. 2.....10 00

They are cast true and smooth, free from seam, and provided with a good base to stand firm.



CAST IRON WAGON SKEINS.

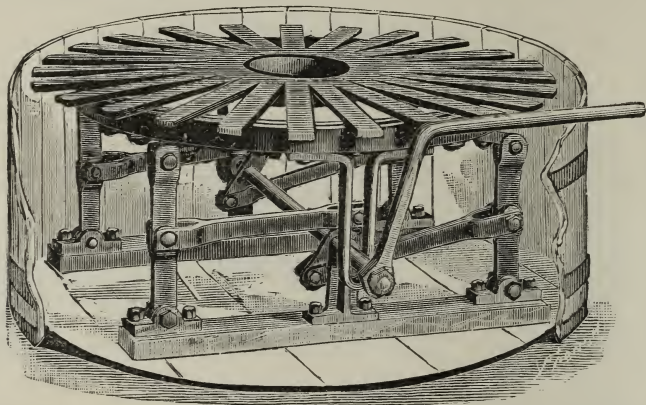
The above engravings represent our Improved Big Mouth Cast Iron Wagon Skeins. They are cast true by a new method, no seams appearing on skein or box, and have the largest opening for wood axle of any skein in the market, and are furnished with straight or wedge boxes in sizes and price as shown on opposite page. A sample order will explain their advantages over others.

PRICE LIST.

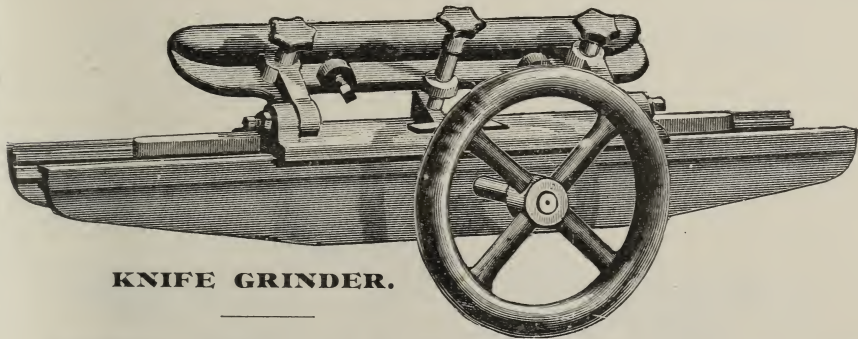
SIZE.	PER SET.
2 " x 6 "	\$3 25
2 " x 6 $\frac{1}{2}$ "	3 25
2 $\frac{1}{8}$ " x 6 $\frac{1}{2}$ "	3 50
2 $\frac{1}{4}$ " x 7 "	3 75
2 $\frac{1}{4}$ " x 7 $\frac{1}{2}$ "	4 00
2 $\frac{3}{8}$ " x 7 "	4 00
2 $\frac{3}{8}$ " x 7 $\frac{1}{2}$ "	4 00
2 $\frac{1}{2}$ " x 7 "	4 50
2 $\frac{1}{2}$ " x 7 $\frac{1}{2}$ "	4 50
2 $\frac{1}{2}$ " x 8 "	4 75
2 $\frac{3}{4}$ " x 8 "	5 25
2 $\frac{3}{4}$ " x 8 $\frac{1}{2}$ "	5 40
2 $\frac{3}{4}$ " x 9 "	6 00
3 " x 9 "	6 00
3 $\frac{1}{4}$ " x 9 "	7 00
3 " x 10"	6 50

SIZE.	PER SET.
3 $\frac{1}{4}$ " x 10 "	\$7 50
3 $\frac{1}{4}$ " x 11 "	7 75
3 $\frac{1}{2}$ " x 10 "	8 00
3 $\frac{1}{2}$ " x 10 $\frac{1}{2}$ "	8 00
3 $\frac{1}{2}$ " x 11 "	8 30
3 $\frac{1}{2}$ " x 12 "	8 80
3 $\frac{3}{4}$ " x 11 "	9 00
3 $\frac{3}{4}$ " x 12 "	9 40
4 " x 12 "	10 60
4 $\frac{1}{4}$ " x 12 "	15 00
4 $\frac{1}{2}$ " x 12 "	18 00
4 $\frac{1}{2}$ " x 13 "	20 00
5 " x 13 "	23 00
5 " x 14 "	25 00
5 $\frac{1}{4}$ " x 14 "	27 50

Discount



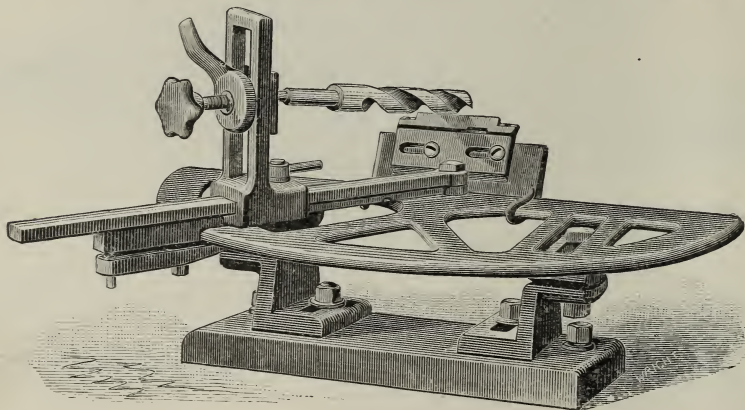
This engraving represents a patent Tire Setting and Cooling Machine, which is used by wagon and wheel makers for straightening up and shrinking the tire on vehicle wheels.



KNIFE GRINDER.

As represented on this page, is by far the most convenient and reliable device for grinding Planer Knives, Bits, etc. It is made entirely of iron, and can be attached to any grindstone or emery wheel frame. The frame or base is planed and scraped to an accurate fit, making the sliding carriage on it fit nicely and work with ease. The plates and jaws which hold the knife are hinged to the sliding carriage and can be adjusted to any angle or bevel.

The knife is held firmly in the jaws and can be adjusted to a nicety by turning the hand screw on top, making the edge perfectly true and at any bevel. The machine is a very convenient and reliable one. We also furnish this tool with an iron grindstone frame, all complete.

MOSS' PATENT DRILL GRINDING MACHINE.





THE LATEST AND BEST.

THE BEST FOR THESE REASONS:

- 1st. It will grind twist or flat drills equally well.
- 2d. It will do perfect work.
- 3d. It will grind each side of the drill exactly alike and give the
. . . . necessary clearance.
- 4th. It does not require a skilled mechanic to do the grinding.
- 5th. It can be attached to any grindstone or emery wheel.
- 6th. It is guaranteed to give satisfaction.
- 7th. Price is only \$20.00.

THE BEST WORK

BY THE

SIMPLEST MEANS

IN THE

SHORTEST TIME

IS SECURED BY THE USE OF

THE DEFIANCE MACHINES.

